Mrs. M. LOFTUS.—Keeping time for Capt. Loftus.
FRANCIS CHIT.—Royal Photographer to the King. Preparing and developing in dark room No. 3 for Capt. Loftus.
W. BRAY.—Attending to plates for Capt. Loftus.
F. G. PATTERSON.—Keeping time in large Observatory with Mr. Murray.
— HENDRICKE and W. H. LANG.—Attending to the Prismatic Camera in large Observatory.
C. BETHJE.—Dr. Schuster's amanuensis during totality.
Capt. J. THOMPSON, R.S.N., and EDWARD H. LOFTUS.—Signalling time between the large Observatory and the Siderostat Observatory.
Capt. CHUNG, R.S.W.—In charge of thirty Siamese, guarding the Observatory ground.

Six Seamen from H.M.S. Lapwing.

Carpenter, Blacksmith, and Two Seamen in large Observatory, taking plates between dark rooms and instruments.
Two Seamen in Siderostat Observatory: one to bring plate from dark room and watch the Corona, and the other to open and shut the Camera slide.

It was not till the day of the eclipse that we got the instruments in anything like position, and even then they were but half tested. We then had a couple of rehearsals, and by mid-day everyone was fully prepared and thoroughly knew the part he would have to perform during totality. This was entirely due to the indefatigable and untiring manner in which Dr. Schuster examined into every detail, and to the readiness with which everyone, without exception, undertook the part allotted him, and did his utmost to understand all the requirements of the position.

After leaving Siam our party separated at Singapore, Dr. Schuster bound for Simla, Mr. Beazley for Japan and China, Mr. Eschke for Berlin, the writer alone returning to England with the results obtained by the Expedition.

FRANK EDW. LOTT

NOTES

THE deaths of two eminent astronomers are announced: Prof. d'Arrest, of the University of Copenhagen, who died on June 14, in his fifty-third year; and Prof. Winlock, the distinguished Director of Cambridge Observatory, U.S.

WE learn with the greatest pleasure that a thorough and systematic observation of the cirrus clouds is in the course of being established in other countries than Sweden. The great importance of these observations we recently urged on the attention of meteorologists in reviewing Dr. Hildebrandsson's "Essay on the Upper Currents of the Atmosphere," vol. xii. p. 123. Dr. Hildebrandsson has undertaken the discussion of these observations, and already the meteorological institutes and societies of Norway, Denmark, France, Austria, Portugal, and Scotland have promised their assistance and agreed to send to Sweden observations from several stations in their respective countries.

THE following Commission has been appointed to inquire into "the practice of subjecting live animals to experiment for scientific purposes, and to consider and report what measures, if any, it may be desirable to take in respect of any such practice:" —Viscount Cardwell, Baron Winmarleigh, W. E. Forster, Sir J. B. Karslake, Prof. Huxley, Prof. Erichsen, and R. H. Hutton.

DR. GERALD F. YEO has been elected to the professorship of Physiology in King's College, London.

IN vol. xi. p. 475, we announced the discovery of a boiling lake in the island of Dominica. The *Trinidad Chronicle* of May 21 contains an account of a visit to the spring by Mr. H. Prestoe, superintendent of the Trinidad Botanic Gardens. The lake lies in the mountains behind Roseau, and in the valleys around many *souffrières*, or solfataras, are to be met with. The Boiling Lake is a gigantic solfatara, with an excess of water-volume over the ejective power exerted by its gases and heat. It is affected by a very considerable volume of water derived from two converging ravines which meet just on its north-west corner, and owing to the existence of a small hill immediately opposite (which has had the effect of diverting the course of the ravine-water into its present channel), the action of the solfatara has caused the formation of a crater-like cavity, which is now the Boiling Lake with its precipitous and ever-wasting banks on its north and south sides, of some sixty feet depth. The temperature of the lake ranges from 180° to 190° F. The point of ebullition seems to vary its position somewhat; the water rising two, three, and sometimes four feet above the general surface, the cone dividing occasionally into three, as though ejected from so many orifices. During ebullition a violent agitation is communicated over the whole surface of the lake. The sulphurous vapour arises in pretty equal density over the whole lake, there being no sudden ejection of gas observed from the point of ebullition; there are no detonations; the colour of the water is a deep dull grey, and it is highly charged with sulphur and decomposed rock. As the outlet of the water is constantly deepening, the surface of the lake must gradually become lower, and it will, Mr. Prestoe thinks, ultimately be destroyed, and its character be changed to that of a geyser. It will then gradually fill up by the reduction of the adjacent hill-sides, and innumerable solfataras will be formed in the place of the present gigantic one. Mr. Prestoe found no bottom with a line of 195 feet, ten feet from the water's edge. One great result of the action of solfataras is the decomposition of the volcanic rock and the development therefrom of various kinds of gypsum. Some blocks met with have a very strong resemblance to the Tuscany or Volterra marble. Mr. Prestoe thinks that these large solfataras have had much to do in bringing about the present conformation of the district.

DOMINICA, which was formerly one of the chief coffee-producing countries, has of late years almost entirely ceased to grow the plant. The capabilities of the island, however, are apparently so great, not only for the cultivation of coffee, but also for many other food products, that the attention of the authorities has been directed to the matter, and the result is that Mr. Prestoe, of the Botanic Gardens, Trinidad, has been commissioned to examine and report on the prospects of the island generally, and the best means of developing its resources. We anxiously await the details of Mr. Prestoe's report upon an island so fertile and beautiful as Dominica, but which has, no doubt, through want of European capital and energy, been allowed to drift almost into an unprofitable waste.

THE *Times* of last Thursday contains a letter, dated Yokohama, April 11, from its correspondent on board the *Challenger*, giving an account of the cruise from Mindanao by New Guinea and the Admiralty Islands to Japan. An extremely interesting account is given of the natives of New Guinea at Humboldt Bay and of the Admiralty Islanders. The following are the principal results of the soundings made:—The greatest depth in the section, 2,250 miles long, from the Admiralty Islands to Japan, was found on the 23rd of March in 4,575 fathoms, between the Carolines and Ladrones. This is the deepest trustworthy sounding on record, with the exception of two taken by the *Tuscarora* off the east coast of Japan, in 4,643 and 4,655 fathoms respectively, but no sample of the bottom was procured on either of these occasions. A second sounding gave 4,475 fathoms. The tube of the sounding machine contained an excellent sample of the bottom, which was of a very peculiar character, consisting almost entirely of the siliceous shells of *Radiolaria*. Three out of four Miller-Casella thermometers sent down to these depths were crushed to pieces by the enormous pressure they had to bear; the fourth withstood the pressure, and registered, when corrected for the pressure, at 1,500 fathoms, the usual temperature for that

depth, 34°·5 F. ; so that at that place there is a layer of water at that uniform temperature occupying the bottom of the ocean trough of the enormous thickness of 3,075 fathoms (18,450 feet). The observations made in this section, taken in connection with others made elsewhere, would seem to point to the following law :—That "Globigerina ooze"—a rapidly forming deposit, containing the whole of the abundant carbonate of lime of the shells of the Foraminifera living on the surface and beneath it, and consequently consisting of almost pure carbonate of lime—generally occupies depths under 2,000 fathoms in the ocean ; that beyond this depth, the proportion of the calcareous matter is gradually diminished, and the deposit, which now contains a considerable amount of clay, goes under the name of grey ooze ; that at 2,600 fathoms the calcareous matter has almost entirely disappeared, and we have the purest form of "red clay," a silicate of alumina and iron with siliceous tests of animals ; that from this point the "clay" decreases in proportion, and the siliceous shells increase, until at extreme depths the "clay" is represented by little more than a red cement, binding the shells together. As to the transition from the "Globigerina ooze" to the "red clay," the *Times* correspondent says, it is due to the removal of the lime of the Globigerina shells by water and carbonic acid, or in some other way ; the apparent disappearance of the "red clay" is a fallacy produced by the increased proportion of the siliceous shells. It has now been ascertained by the use of the tow-net at great depths that Radiolarians and Diatoms inhabit the water all the way down, and are probably more abundant at greater depths ; and it follows from this that four times more, at least, must die and shed their tests in 4,000 fathoms than in 1,000 fathoms. The most marked temperature phenomenon observed in the two sections was the presence of a surface layer of water of an average depth of 80 fathoms, and a temperature above 77° F., extending northwards from the coast of New Guinea about 20°, and westward as far as the meridian of the Pellew Islands. The greater part of this huge mass of warm water is moving with more or less rapidity to the westward.

M. JANSSEN was present at Monday's sitting of the Paris Academy.

THE preparations for the Geographical Congress in Paris are being actively completed. The large map of France executed by the staff officers will be exhibited, all the sheets having been joined, thus forming one continuous sheet of paper of immense size. The map will be exhibited at the Tuileries in the Salle des États. It will be photographed by the microscopical and panoramic process. There is a law prohibiting valuable documents in the National Library, Paris, from being taken out of the building. But a large hall will be set apart for their exhibition, and all the members of the Geographical Congress will get free admission to view them as often as they may desire.

M. LEVERRIER, at Monday's sitting of the Paris Academy, intimated that the great reflecting telescope, and other large apparatus, will be ready for inspection by the members of the Geographical Congress on their visit on the 5th of August.

MR. A. J. ANDERSON, from Manchester Grammar School, and Mr. T. W. Stubbs, from Clifton College, have been elected to Demyships in Natural Science in Magdalen College, Oxford. Mr. H. A. Wilson, of Magdalen College School, was at the same time elected to the Exhibition in Natural Science. The stipend of the Demyships is 95*l.* per annum, and of the Exhibition 75*l.* They are tenable for five years.

S. NALL has been elected to a Foundation Scholarship for proficiency in Natural Science at St. John's College, Cambridge. Stewart, Lowe, and Houghton to Exhibitions.

J. T. MÖLLER, of Wedel (Holstein), having been repeatedly requested to publish his process of preparing Diatomaceæ, has resolved to adopt the following plan :—If a sufficient number of subscribers is obtained, he will publish a work with illustrations, under the title of "The Preparation of the Diatomaceæ," which will contain—1. The collecting ; 2. The cleaning and purifying (*a*) of the living subjects ; (*b*) of dead subjects in the mud ; (*c*) of fossils. 3. The separation of the different species. 4. The preparation and mounting (*a*) in the ordinary manner—in quantity ; (*b*) as selected and arranged ; (*c*) as "Typen- and Probe-platte," &c.

WE believe that the *Pandora*, which has just sailed to attempt the north-west passage, has been fitted out at the joint expense of Lady Franklin, Mr. James Gordon Bennett, Lieut. Lillingston, and Capt. Allen Young—the last-mentioned, however, bearing the major portion of the cost, as well as the whole risk of the voyage. We are glad to hear that the health of Lady Franklin, who has been seriously ill, has considerably improved. On Monday evening the *Pandora* finally left Plymouth for Disco. On the same day, the *Times* says, there was to sail from Sunderland Dock a small sloop named the *Whim*, bound to the Arctic seas and zone ; it is under the command of Capt. Wiggins, of the merchant service, and is manned by five able seamen. The little vessel is only twenty-seven tons register. Capt. Wiggins is bound for the Russian coast.

ON Monday evening an extraordinary meeting of the Royal Geographical Society was held, at which the Seyyid of Zanzibar who was present, was received with great enthusiasm, and expressed his anxiety to do all in his power to forward the objects of the Society. Mr. John Forrest gave an account of his journey across the western half of Australia, from Champion Bay on the west coast to the Overland Telegraph line. We have already given some details of the journey in vol. xi. p. 93. Mr. Forrest concluded by stating that all the geographical problems have now been finally solved, and the only remaining portion of interest is the small part in the north-west corner from Roebuck Bay to the Victoria River.

AT the above meeting Dr. W. B. Carpenter read a paper on recent observations on ocean temperature made in the *Challenger* and *Tuscarora*, with their bearing on the doctrine of a general oceanic circulation, sustained by difference of temperature.

UNDER the heading of "Early Indications of Spectroscopy in America," the *American Chemist* for May reprints two papers by Dr. David Alter, from the *American Journal of Science* of 1854 and 1855, in which he describes some experiments made by him on the spectra of metals and gases, at least three years before the publication of the researches of Bunsen and Kirchhoff.

THE Sub-Wealden Exploration has made considerable progress during the past week. A further depth of 108 feet has been reached in five days, making a total of 1,246 feet.

THE most interesting objects which attract attention at the Southport Aquarium just now are the eggs of the Rough Hound (*Squalus catulus*), which were deposited in the tanks about the beginning of December of last year. All the eggs seem to be in a healthy condition, and the young fish are now so far advanced that their movements within their horny cases can be distinctly traced, and possibly only a short interval will elapse before they are completely free. Mr. Long anticipates a similar result from the eggs of the Skate (*Raia batis*) deposited in February last. The fine Sturgeon about eight feet long, and about thirty specimens of the Sea-horse (*Hippocampus brevirostris*) are also objects of much interest.

WITH reference to our note (vol. xii. p. 135) on the attempt to acclimatise humming-birds in Paris, a correspondent informs us

that Mr. Gould some years ago succeeded in bringing a living pair within the confines of the British Islands, and a single individual to London, where it lived two days. The birds were quite lively during the voyage across the Atlantic, but began to droop when off the coast of Ireland; and, as we have said, Mr. Gould succeeded in bringing only one to London alive. Particulars will be found in Mr. Gould's "Monograph of the Trochilidæ."

FURTHER details are to hand of the earthquake which on May 18 caused so much destruction in the valley of Cucuta, in the Republic of New Granada. The destruction to life and property has been almost unprecedented. The German drug store, it is stated, was set on fire by a ball of fire that was thrown out of the volcano, which, at the time the news left, was constantly belching out lava. The volcano has opened itself in front of Santiago, in a ridge called El Alto de la Giracho. In reference to this, see the letter we publish to-day from Mr. W. G. Palgrave.

THE final arrangements have been made for holding the forty-third annual meeting of the British Medical Association, which meets in Edinburgh this year on August 3, under the presidency of Prof. Sir Robert Christison, Bart.

AN exhibition is to be held in Belgium next year of all such apparatus, sanitary arrangements, or scientific appliances as are calculated to preserve health or to save life.

WITH the *Gardener's Chronicle* of last Saturday is published a beautifully illustrated supplement, giving an account of Chatsworth, the seat of the Duke of Devonshire.

THE Brussels Académie Royale has just published a new edition of its "Notices Biographiques et Bibliographique." This volume contains a brief sketch of the history of the Academy, a list of Presidents, honorary, corresponding, and ordinary members and associates in the various classes, followed by brief biographical notices of all the members who have contributed papers, with full lists of their contributions. The volume is a very valuable as well as a very interesting one.

MESSRS. TRÜBNER AND CO. have published a pamphlet by Dr. A. Stœcker (translated by Dr. Harrer) giving much useful information concerning the baths and mineral springs of Wildungen, about one hour's distance from Cassel. The springs, of which there are five in use, are more or less alkaline-chalybeate, and seems to possess important curative qualities. In connection with this subject the following recently published statistics of the numbers of patients that visited the German and Hungarian watering-places during 1874 will be interesting:—Baden-Baden, 41,464; Buziasch, 813; Carlsbad, 20,235; Elster, 4,373; Franzensbad, 7,655; Gleichenberg, 3,373; Gastein, 1,253; Gmunden, 1,202; Giesshübl, 12,625; Gräfenberg, 847; Hall, 2,000; Ischl, 9,386; Ilmenau, 1,468; Krankenheil, 1,010; Königswart, 313; Neuenahr, 3,405; Oeynhausen, 3,254; Kryniza, 2,080; Luhatschowitz, 942; Marienbad, 9,861; Nanheim, 4,152; Pystian, 1,709; Reichenhall, 4,215; Reinerz, 2,352; Rohitsch, 2,603; Szczawinca, 2,033; Teplitz-Trentschin 1,655; Tüffer, 2,061; Vöslau, 3,865; Wartenberg, 805; Warmbrunn, 1,960; and Wiesbaden, 65,800.

THE additions to the Zoological Society's Gardens during the past week include a Black-backed Jackal (*Canis mesomelas*) from S. Africa, presented by Messrs. Donald Currie and Co.; an Indian Coucal (*Centropus rufipennis*) from India, presented by Mrs. Hunter Blair; a Small Hill Mynah (*Gracula religiosa*) from S. India, presented by Sir Charles Smith, Bart.; a Golden Eagle (*Aquila chrysaëtos*) from India, presented by Mrs. Logan Horne; two Chinese Quails (*Coturnix chinensis*) from China, presented by Mr. A. Jamrach; two Virginian Eagle Owls (*Bubo virginianus*) from N. America, deposited; two White-winged Choughs (*Corcorax leucopterus*) from Australia, a Salle's Amazon (*Chrysotis salleei*) from St. Domingo, purchased; five Australian Wild Ducks (*Anas superciliosa*) bred in the Gardens.

RECENT PROGRESS IN OUR KNOWLEDGE OF THE CILIATE INFUSORIA *

III.

IT follows from this view that the cavity of the Cœlenterata would represent an intestinal cavity only, while a true body cavity would be here entirely absent. This way of regarding the cavity of the Cœlenterata is at variance with the conclusions of most other anatomists who regard the cœlenterate cavity as representing a true body cavity, or a body and intestinal cavity combined. I had myself long entertained the generally accepted opinion that the cavity of the Cœlenterata represents a body cavity. I must, however, now give my adhesion to the doctrine here advocated by Haeckel, and regard the proper body cavity of the higher animals as having no representative in the Cœlenterata. I believe that this is supported both by the facts of development and by the structure of the mature animal. Indeed, the body cavity first shows itself, as Haeckel has pointed out, in the higher worms, and is thence carried into the higher groups of the animal kingdom.

If such be the real nature of a true intestinal cavity and of a true body cavity, it is plain that neither the one nor the other can exist in the Infusoria, for there is here nothing which can be compared with either the endoderm or the ectoderm.

The whole, then, of the alleged chyme of the Infusoria is nothing more than the internal soft protoplasm of the body. It is quite the same as in Amœba and many other unicellular animals.

The peculiar currents which have been long noticed in the endoplasm of many Infusoria must be placed in the same category with the rotation of the protoplasm observed in many organic cells. Von Siebold, indeed, had already compared the endoplasm currents of the Infusoria to the well-known rotation of the protoplasm in the cells of Chara.

The presence of a mouth and anal orifice in the ciliate Infusoria has been urged as an argument against the unicellular nature of these organisms. The so-called mouth and anus, however, admit of a comparison not in a *morphological* but only in a *physiological* sense with the mouth and anus of higher animals. They are simple lacunæ in the firm exoplasm, and have, according to Haeckel, no higher morphological value than the "pore canals" in the wall of many animal and plant-cells, or the micropyle in that of many egg-cells. Kölliker had already compared them to the excretory canal of unicellular glands. Since, therefore, they do not admit of being homologically identified with the orifices of the same name in the higher animals, Haeckel proposes for them the terms "*Cytostoma*" and "*Cytopyge*."

So also the presence of a contractile vesicle and of other vacuoles affords no solid argument against the unicellularity of the Infusoria. The physiological significance of the contractile vesicles has been variously interpreted. In certain cases a communication with the exterior appears to have been demonstrated, and Haeckel regards them as combining two different functions of nutrition, namely, respiration and excretion. They are in all cases destitute of proper walls, and they have been long recognised as morphologically nothing more than lacunæ filled with fluid. Regular contractile vesicles differing in no respect from those of the ciliate Infusoria are often found in the Flagellata and in the swarmspores of many Algæ.

Besides the constant and regular contracting vacuoles, there occur also others less constant and less regularly contracting. These are found in the softer endoplasm, while the constant and regularly contracting vacuoles occur for the most part in the firmer exoplasm. One is just as much a wall-less vacuole as the other, and the difference between them is to be traced to the difference of consistence in the surrounding protoplasm. Haeckel regards the less constant ones as the original form from which the others have been phylogenetically derived, that is, by a process of inheritance and modification through descent.

The last and most important of the parts which enter into the formation of the Infusorium body, namely, the nucleus, is next discussed. Viewed from a morphological point, it has been already demonstrated that the nucleus is in all Ciliata originally a single simple structure, resembling in this respect a true cell-nucleus. As the Infusorium body approaches maturity we find that with its advancing differentiation peculiar changes occur in the nucleus just as in the rest of the protoplasm, but these changes are entirely paralleled by differentiation phenomena

* Anniversary Address to the Linnean Society, by the President, Dr. G. J. Allman, F.R.S., May 24. Continued from p. 157.